Zachary Fruhling
Summary of “What’s Wrong With Microphysicalism?” by Andreas Huttemann
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Andreas Huttemann presents an argument against microphysicalism, which is a broad term for the related views that the microphysical has ontological priority over the macrophysical and hence that all genuine causation happens at the micro-level. He argues that the great success of microphysical explanations in terms of part-whole relationships does not entail ontological or causal microphysicalism. Huttemann considers and rejects three possible strategies one could use in making the case for microphysicalism: micro-determination, micro-government, and micro-causation, each of which is defined below.

To begin, Huttemann distinguishes between four possible types of micro-explanation: explanation concerning two properties of the same system (for laws or for system-states), and part-whole explanation (also for laws or for system-states). Huttemann argues that it is part-whole micro explanation in terms of laws (what he calls microphysicalism type 3) that is most promising as a candidate for a successful microphysical explanation paradigm. Microphysical explanations concerning two properties of the same system will all leave an explanatory gap that fails to explain why a link exists between the two properties or events in question. For example,

supposing it were possible to establish a bridge-law connecting a micro-property and a macro-property, the bridge law leaves unexplained *why* a particular micro-property instantiates the macro-property. Huttemann has in mind here the proposal of Jaegwon Kim that a successful reduction of mental properties could be achieved by a combination of bridge-laws linking functional relationships. Huttemann holds that this strategy has an inherent explanatory gap that renders it less fruitful than the part-whole strategy.

Regarding the other possibilities, Huttemann cites the example of quantum entanglement as a counterexample to part-whole microphysical explanations in terms of states, since it is impossible to determine precisely the micro-physical states of a compound quantum system. The other possibilities having been eliminated, Huttemann finds that it is part-whole micro-physical explanations in terms of laws rather than states that will be most fruitful as a paradigm for micro-physical explanation. He argues that this kind of explanation is more important in the sciences. In addition he claims that this approach to micro-physical explanation holds promise as an explanation for properties in general because properties can be explained in terms of their causal or functional role (i.e. the laws in which the properties participate).

His focus having been narrowed to the type of micro-physical explanations he is interested in, Huttemann defines the central claim

of, or rather argument for, micro-physicalism. Huttemann argues that proponents of microphysicalism hold that the success of the types of explanations discussed above provides evidence for the ontological and causal priority of the micro-level over the macro-level. It is this claim that Huttemann tries to argue against by means of his arguments against micro-determination, micro-government, and micro-causation.

The question concerning micro-determination is not strictly-speaking a question of whether the micro-level determines the macro-level (in a mereological sense), since there must be, according to Huttemann, some type of dependence relation here to maintain the part-whole relationship. The real question is whether this dependence is what he calls “hegemonic”; i.e. a one-way relationship without determination in the other direction, from micro to macro. He argues that supervenience relations alone will not suffice to exclude the existence of reverse dependencies of the type just mentioned. He cites as his justification the relationship between pressure, volume, and temperature in the ideal gas law. In the case of the ideal gas law, each of the variables depends on the other two variables. In other words the determination relation is non-directional and hence there is no hegemonic relationship involved. Certainly pressure, for example is determined by volume and temperature; but it does not follow from this that volume and

temperature are not themselves determined by pressure. In other words, it is possible for the determination relation to be bi-directional. When this reasoning is applied to a mereological picture of reality, Huttemann claims that one finds bi-directional determinations rather than unidirectional ones. Huttemann return to his example of the equations governing quantum mechanics to show this. Just as in the ideal gas law, there are equations governing the components of a compound quantum system. Fixing all but one of the variables in the equation will determine the value for the unspecified variable. But it is also true that each of those fixed variables would themselves be determined if they were left unspecified and all the others fixed. In other words, at a fundamental level in nature one finds bidirectional determination relations rather than unidirectional ones. None of these considerations hinder the success of micro-physical explanations, but Huttemann argues that the priority of bottom-up determination relations is not justified by the success of those explanations.

Next Huttemann considers argues against the thesis of micro-government, which is the thesis that there are no autonomous macro-physical laws. In other words, micro-government is the claim that all genuine physical laws are microphysical laws. The autonomy of the various special sciences hinges on the truth or falsity of this thesis. While Huttemann offers four competing interpretations of the thesis

of micro-government, his arguments against each of these interpretations may be reduced to a common insight. Huttemann argues that the thesis of micro-government is only plausible by taking micro-laws as the starting point and arguing for determination relations upwards to higher mereological levels and associated "laws" (in quotes because there are no such laws on the micro-government picture). Huttemann straightforwardly rejects the micro-level as the only viable starting point and argues that one might just as well begin with the macro and work downwards.

Huttemann also defends a more radical position of his own, viz. that the thesis of micro-government fails because it is possible to find instances of a macro-law in effect but without a corresponding micro-law being instantiated. In addition to further examples from quantum mechanics to argue for this position, Huttemann cites the case of a metal's specific heat. Metal is thought of as having two sub-systems, the crystalline part and the electronic part. Both components contribute to the metal's specific heat. One can explain the behavior of the compound system, i.e. the metal, by appealing to the behavior of the specific parts, but the contributions of each of the components cannot be measured due to their inability to be isolated from the other subsystem. Huttemann argues that for a law to be instantiated at a given level, it must be possible to isolate that level from other systems. If it is not possible to isolate a given system,

then no law can be instantiated at that level. He takes this to be an essential feature of the pragmatics of law-based explanation. In other words, if one cannot isolate the system in question, then one is not justified in positing any laws regarding that system. So here then is a case where there are definite laws at the macro-level (specific heat), but without any corresponding laws at the micro-level. This constitutes positive proof for the falsity of micro-government that is stronger than the above argument that micro-government has an arbitrary starting point in its logic.

Huttemann lastly argues against the thesis of micro-causation, which is the view that all real causal relations are those at the micro-level. He considers three possible variants of this thesis: *epiphenomenalist causation*, in which the relation between micro-and macro is one of causation but without any causal relation between successive macro-properties; *supervenient causation*, in which the macro-level supervenes on the micro-level but without any causal relation between successive macro-properties (Kim's insistence that this could count as genuine causation aside); and *reductionist causation*, in which the macro-level is in some sense identical with the micro-level.

Regarding epiphenomenalist causation, Huttemann argues that this account of micro-causation must be false due to the fact that the relation between macro and micro cannot be one of causation because

of the lack of time-factor involved in the part-whole relation. Causation is a relation between successive temporal states, but the part-whole relationship is instantaneous, so to speak. Similarly, the relation between macro and micro cannot be one of supervenience insofar as supervenience prioritizes the micro over the macro. Huttemann appeals to his earlier considerations about dependence to make this claim. And finally, the view that the macro could be identical with the micro is false, Huttemann claims, because in addition to the behavior of mereological parts, laws of composition are needed to explain the behavior at the macro level. The necessity of these laws of composition in addition to the mereological parts makes a strict identity between macro-behavior and micro-behavior impossible.